

## **2003 AGRIBUSINESS GROUP PAPER**

### **ABSTRACT**

Agribusiness is a vital segment of US commerce, a critical part of American infrastructure, and an often overshadowed component of our national security strategy. Its importance to the US has been likened to that of oil to the Middle East. History demonstrates that a nation able to feed its own citizens is inherently stronger and thus able to provide a safer and more secure society. US agribusiness leads the world, yet faces continued competition in an environment of technological change and global agribusiness consolidation. This report assesses the entire industry while focusing on four key areas: water use, land management, grains and fibers, and food safety and security.

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## **PLACES VISITED**

### **Domestic**

Acosta Food Brokers, Richmond, VA  
Beaulieu Vineyards, Rutherford, CA  
Beltsville Agricultural Research Center (USDA), Beltsville, MD  
California Cattlemen's Association, Sacramento, CA  
Chicago Board of Trade, Chicago, IL  
Duda Farms, Salinas, CA  
Federal Reserve Bank of Chicago, Chicago, IL  
Heinemann's Bakeries, Chicago, IL  
Kraft (Nabisco) Bakeries, Chicago, IL  
Pilgrim's Pride Chemistry Laboratory, Broadway, VA  
Pilgrim's Pride Chicken Processing Plant, Broadway, VA  
Rominger Brothers Farm, Winters, CA  
San Francisco Public Utilities Commission's Land and Resources Management Office,  
Sunol, CA  
SYSCO Produce, Salinas, CA  
St. Supery Vineyards, Rutherford, CA  
Tanimura & Antle Produce Processing, Spreckels, CA  
United States Department of Agriculture, Washington, DC  
United States House of Representatives (House Agriculture Committee), Washington, DC  
University of California, Davis, CA  
Van Steyn Dairy Farm, Elk Grove, CA  
Wal-Mart Grocery Distribution Center, Bedford, PA

### **International:**

Advisory Committee, Ministry of Economic Development for the Russian Federation, St.  
Petersburg, Russia  
Baltic Cranberries, St. Petersburg, Russia  
Farmers Market, St. Petersburg, Russia  
Heineken Brewery, St. Petersburg, Russia  
Klinskoe Sun-Interbrew Brewery, Klin, Russia  
Kraft Foods International, Pokrov, Russia  
McDonalds Processing and Distribution Center, Moscow, Russia  
PARNAS-M Meat Processing Plant, St. Petersburg, Russia  
Podolsky Horse Farm, Moscow, Russia  
Russian Association of Farmers Enterprises and Agricultural Cooperative Societies, Moscow,  
Russia  
US Consulate - Consul General and Staff, St. Petersburg, Russia  
US Embassy - Defense Attache, Agriculture Attache, and Economic Advisor, Moscow, Russia

## INTRODUCTION

“Agribusiness is to the United States what oil is to the Middle East.”<sup>[1]</sup> This single statement encapsulates the criticality of agribusiness to the United States – to our economy, our way of life, and our national power. No other industry crosses such a broad and diverse constituency – every person living in the US is touched by and benefits from agribusiness.

History demonstrates that a nation able to feed its own citizens is inherently stronger and thus able to provide a safer and more secure society. Conversely, a nation dependent on other nations for food is inherently more vulnerable and subject to the whims of external forces. Agribusiness is a key component of our national power, and is one of the few industries that produces net exports each year. Further, the abundance of American agriculture provides food for much of the world through our foreign aid and humanitarian assistance programs. Agribusiness is a source of great strength for our nation.

The purpose of this study is to determine the current condition of American agribusiness, assess the overall “health” of the industry, and make recommendations for future actions by members throughout industry and government. This study encompasses the entire agribusiness industry from input suppliers to growers and farmers, to manufacturers all the way through to exporters, to the retail marketing and distribution system, and ultimately to the consumer; in short, “from the tomato seeds to the ketchup on the table!” Study methodology included in-depth analysis and research of diverse agribusiness topics, in-class presentations by industry experts, and field studies at both domestic and international entities spanning the entire industry. Throughout this study, efforts were focused on four major areas impacting agribusiness today – land use; water use, rights, and conservation; grains and fibers; and, food safety and security.

## AGRIBUSINESS DEFINED

The concept of agribusiness has evolved over the years. Two Harvard economists, John Davis and Ray Goldberg, first defined the term “agribusiness” in 1957. They viewed it as “the sum total of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing and distribution of farm commodities and the items made from them.”<sup>[2]</sup> This definition established agriculture as an industry that goes far beyond simply growing crops and raising animals. Today, there are many definitions, but what endures is the recognition of the breadth and depth of agribusiness industry.

For purposes of this study, agribusiness encompasses all business activities that take place from farm to fork. It is a vast and complex industry, stretching from the biotechnologist working on a new food to the Chicago Board of Trade futures trader. It is a diverse discipline – not just agriculture or business. It is a combination of both business and technology. It is the business of food and fiber production and the technology to change a raw material or an idea into a new product or business for the world’s consumers. Implicit in this description are labor issues, import/export considerations, impacts on commodity markets and food processing, and implications for government policy.

## CURRENT CONDITION OF AMERICAN AGRIBUSINESS

Farming accounts for only part of the overall agricultural business of the United States (US), and by itself, accounts for just 1% of US Gross Domestic Product (GDP). However, when combined with the large support system of the entire agricultural industry plus related industries (equipment stores, packing sheds, seed warehouses, etc.), domestic agricultural business contributes \$1.5 trillion or 16% of US GDP and employs 17% of the workforce.<sup>[3]</sup> The structure of the farm sector has changed to meet a new globally competitive marketplace. While the domestic agricultural market is mature, the global market is evolving. Technological advances have increased agribusiness productivity and competition,

and farmers continually seek ways to increase profitability.

## The US Market

The US market is mature, with food costs to the consumer lower than ever. Agricultural product demand is driven by consumer desires for safe, accessible, and diverse food rather than just food to meet basic energy requirements.<sup>[4]</sup> Further, agricultural products are demand sensitive – when demand increases for one commodity, demand decreases for other agricultural products. Consequently, US agribusiness looks to global markets to absorb their excess capacity, provide growth, and help improve profits. The US is the world's largest agricultural exporter<sup>[5]</sup> with \$53B in exports for FY01.<sup>[6]</sup> We expect to increase US agricultural exports as we continue to reduce global trade barriers. This increasing global market for US agricultural output directly affects farm policy, which now attempts to focus more on opening global markets and keeping American farmers competitive<sup>[7]</sup> rather than on domestic price supports or controlling supply. Today, approximately 40% of US farms receive government program benefits. Of those, 47% are larger, commercial farms.<sup>[8]</sup>

Increased competition and improved technology have doubled farm output over the last 50 years.<sup>[9]</sup> This productivity increase resulted in a reduction in the number of farms. Agribusiness has improved competitive advantage through economies of size, achieved through the consolidation of independent farms. Farmers have integrated vertically and horizontally<sup>[10]</sup> to improve profitability. The current state of US agribusiness includes farms that are engaged from product development to consumer delivery. In addition, a growing number of farms have a dedicated relationship with brand-name companies, like raising chicken specifically for Perdue.

## The Changing Face of US Farming

The globally competitive environment has changed the face of US farming. The agribusiness industry is more diverse today than ever before. Farms are no longer characterized by any single attribute. Today's farms vary in size, grow different kinds of commodities, and operate under a variety of business models, including combinations of owner-operator and tenant-operator.<sup>[11]</sup> This diversity translates into a variety of differing interests and needs for farms depending on size, location, products, and business model, with a corresponding mixture of expectations for government officials and policies.

Historically, US agribusiness consisted primarily of numerous small, family-run farms. Today, the industry has consolidated many of those family farms into agricultural conglomerates. Concentration occurred as farmers became less dependent on labor due to improved farming technologies and techniques, family members moved to urban areas for better prosperity, and owners tired of the economic uncertainty of farming profits as their primary source of livelihood.

This consolidation has reduced the number of farms by more than two-thirds over the last century.<sup>[12]</sup> In the past ten years, the number of large and small farms has stabilized. Commercial farms number 175,000 (defined by annual sales exceeding \$250,000), comprise eight percent of all US farms, but account for 68% of total US agricultural output.<sup>[13]</sup> Three large multinational companies dominate the industry – Novartis/Archer Daniels Midland, Cargill/Monsanto, and ConAgra.<sup>[14]</sup> Another two million farmers are included in USDA statistics, but most do not cover production costs with farm income, forcing them to seek off-farm employment to survive.<sup>[15]</sup> Only 27% of all US farmers consider farming their primary occupation.<sup>[16]</sup>

## Water

Agricultural productivity is directly dependent upon soil, water, climate, and access to markets, leading to geographical clustering of US farms. Most farms are located in the middle of the country. The arid, drought-prone deserts of the west also produce farm products, many of which were artificially developed. US national interests historically included settling the west and feeding the country. As a result, agricultural politics skewed farm development toward the desert west where an essential input - fresh water for crop irrigation - was extremely limited.

The 1902 Reclamation Act diverted water sources to help achieve western settlement. Subsequently, many western states and agricultural producers took advantage of cheap, secure water to produce crops during the depression and after World War II when jobs were scarce. Thus, although much of the west is arid, the region accounts for approximately ten percent of US farms and contributes nearly 20 percent of US food production. <sup>[17]</sup>

## Land Use

In the United States, the percentage of land allocated for cropland, has remained fairly constant despite a trend toward urbanization. This stems from a tradeoff of agricultural land from the east to the west. The US comprises about 2.3 billion acres, with twenty percent of that used as cropland. Thirteen percent includes urban areas, marshes, deserts, bare-rock and tundra. The remainder is forest-use land and permanent grassland. <sup>[18]</sup>

When cropland is taken out of production, it has a direct impact on agricultural output. It is extremely difficult to return land to agricultural productivity once it has been converted to urban use. The indirect impact of urban sprawl is a loss of economic strength and an erosion of agriculture's supporting infrastructure. If population trends continue, the US will experience long-term growth with a corresponding demand for urban areas. Thus, over the next 50 years, it is estimated that farmers and ranchers will have 13 percent fewer acres of high quality farmland as a result of population growth. In a worst-case scenario, the US could become a net food importer vice exporter within the next 60 years. <sup>[19]</sup>

Fortunately, there is no immediate concern for the encroachment of urban sprawl on agricultural land. Urban growth's impact is minimal over the short term, and economic consequences to the agribusiness industry health as a whole are nominal. The US has tremendous lands dedicated to agriculture, and productivity continues to rise. Nevertheless, prudence dictates that the US closely examines the long-term impacts of land use policies.

## Response to Terrorism

Since September 11, 2001, food security has become an increasingly important national security issue. Previously, the possibility of intentional contamination of the national food supply was considered so remote as to be insignificant. Today, however, many are concerned with the risk of deliberate attacks. Recognizing this risk, President Bush added the agriculture and food industries to the list of critical infrastructure sectors needing protection from terrorist attack. <sup>[20]</sup> Since the 9/11 attacks, much work has been done to improve security of US food supplies during the preparation, processing, packaging, and serving phases. However, keeping food secure while it moves from point to point in the system remains a significant concern and is an area where further security improvements are required.

## Grains and Fibers

Currently, grains and fibers production is a hotly contested political issue as the production and consumption of genetically modified organisms (GMO) dominates discussion in this critical agricultural sector. Lack of knowledge regarding the science of genetically modified grains has needlessly raised alarms around the globe. However, readily available documentation regarding scientific research, production methods, and GMO achievements demonstrate that there are no scientifically valid concerns about GMO food safety. The US readily accepts and uses GMOs while nations of the European Union remain uncomfortable. In the near term, this issue will likely remain more political than agricultural. Optimistically, convincing other nations that genetically modified grains do not harm humans or animals and can help safely solve worldwide food shortages should speed global acceptance of these products.

## CHALLENGES

One way to frame the future challenges in Agribusiness is to ask, “Will we retain the self-sufficiency to feed our nation, and will we maintain stability, prosperity, and economic viability in the production of worldwide food resources?” Many factors influence the outcome of these questions, including resources, climate, global market forces, and the conflict of nations.

According to United States Census Bureau projections, during the next fifty years the US population will increase by 50 percent to more than 404 million.<sup>[21]</sup> World population estimates increase to nine billion in the same time frame. These increases will stress water, land, and energy resources. Climatic change will exacerbate these stresses even further. Will advances in agricultural productivity keep pace with demand? Can we rely on continued advances in biotechnology to maintain our competitive lead?

The profitability and quality of tomorrow’s agriculture depends upon today’s research and education system. US farms produce far beyond domestic demand for many crops. Maintaining a competitive agricultural system is critical to ensuring the economic viability of our agribusiness industry.

In recent years, trade rule changes, domestic policy shifts, and technology developments have altered the competitive landscape of the global agribusiness industry and the challenges ahead. The increasing tie between mechanization and computers will produce dramatic changes in our agricultural systems. Farmers must fully embrace the world of information technology. Knowledge management can help farmers, ranchers, and everyone involved in agribusiness. Technology, such as satellite-based geographic information systems and infrared scanning systems, promises more efficient use of our resources and more effective management efforts.

Genetic engineering has increased plant resistance to insects, eliminating the need for and use of many pesticides. Genetic engineering also improves a plant’s water and nutrient efficiency, thus lowering production costs. These new crops represent potential new sources of nutrition for both humans and animals. In addition, development of non-food crops for industrial products such as rubber, waxes, resins, and lubricants will provide the basis for new segments of our expanding agricultural economy. The major challenge in developing these non-food crops is maintaining high environmental safety standards. We must insure that industrial waste does not harm the surrounding environs.

Land development in the United States is following two routes: expansion of urban areas; and, large-lot development (greater than one acre per house) in rural areas. Both result from increasing population growth, and both translate to increasing demand for conversion of farmland to other uses. More people and less land ultimately yield fewer farmers. Increased population also creates opportunity costs for farmers, creating pressure to convert cropland to alternate uses. Virtually all regulatory and policy decisions regarding farmland are at the state or local level. There is no consistent national policy regarding the spread of urban growth and its impact on farmland. As a result, we have no national vision, and no national policies that can be implemented to form an integrated and coordinated approach to preserving our farmland.

Our choices may be to either limit the growth of our population or limit the encroachment on our



farmland, or both. By converting some of our country's best farmland to urban uses, the United States is limiting future options to deal with social, economic, food security and environmental problems. Our challenge is to develop coordinated national policies to address this national strategic problem.<sup>[22]</sup>

As we look to the future, examples of agribusiness challenges include food availability and safety, managing technological advances in agriculture, increasing the globalization of agriculture, biotechnology, the decline in the number of American farmers, government protection policies, and environmental consequences of agricultural production. Answering these challenges will require developing a long-term vision (more than 25 years) to preserve our ability to feed ourselves and protect the resources that are our source of productivity for the next century. That vision must be an integrated global vision encompassing the role of the US Agribusiness Industry and the appropriate policies to respond to the needs of future generations.

## **OUTLOOK FOR AMERICAN AGRIBUSINESS**

A nation's security is defined by its ability to protect its national interests. The 2002 National Security Strategy (NSS) clearly outlines our immediate domestic interests to include physical protection of American life and land as well as protecting American economic prosperity. Beyond these, the NSS speaks to the interests of the international community articulating the global world in which we live and the linkages of American prosperity to international well-being.<sup>[23]</sup> In an international environment increasingly suspect of traditional military power, American Agribusiness provides a resource that readily translates as a commanding tool of "acceptable" influence and power.

Domestically, this nation has chosen to sustain strategic policies and legislation that support and safeguard our ability to remain self-sufficient in food production. Simply put, we are now and will be able in the future to feed ourselves. Policies and legislation support the long-term health and viability of our lands. Farming touches every state; therefore, the viability of our domestic agribusiness industry affects the collective whole of our nation. We continue to improve our productivity while increasing conservation and environmental programs. Federal, state, and local policies provide the safety net farmers require while prioritizing conservation ahead of crop production issues.

### **Global Engagement**

The events of September 11, 2001 brought home the facts that security does not stop at our borders and is not guaranteed solely by military prowess. Agribusiness provides our nation's leadership a unique and potent tool to influence the world through non-kinetic means. With an anticipated 50% global population growth between 2000 and 2050, food production requirements will necessarily increase. Most of this population growth will take place in underdeveloped nation-states located in water-stressed regions. In many of these regions, domestic agribusiness industry projections identify insufficient growth to meet food demands. Because the US has the largest amount of arable land per capita in the world, its agribusiness industry can surge production to help meet world demands.<sup>[24]</sup> As a nation, we offer diplomatic support in the traditional form of food as aide to under-developed and struggling nations. As a nation, we can transfer diplomatic, economic, and informational support in the form of proven agricultural technology, agricultural business models, and land and water management techniques. Economically, agribusiness presents tremendous opportunities for international linkages through direct foreign investment by American flagship corporations.

### **Short-Term**

The agribusiness outlook for the next five years appears promising. While the US population



grew from 150 million to 250 million (66%) between 1950 and 1990,<sup>[25]</sup> agricultural productivity and output improved over 100% during that same timeframe.<sup>[26]</sup> While total farmland in cultivation decreased by more than 130 million acres as land was placed into conservation status, agricultural output increased 150%.<sup>[27]</sup> This productivity trend accelerated during the 1990's as US agriculture production outstripped domestic food requirements. Farm machinery, fertilizers, improved seeds, use of more productive cropland, improved agricultural chemicals, genetically modified crops, technological advances, superior climate predictions, and ongoing research and development expenditures by the United States Department of Agriculture (USDA) account for this improved yield per acre. The US will easily meet all internal food needs well into the foreseeable future. However, as the world's predicted population expands from today's 6 billion people to 9 billion by 2050, underdeveloped countries' inability to feed themselves will increase proportionally. Continued efficiencies in agricultural land use and other agribusiness resources, combined with retention of agribusiness' transferable land mass is important to meet long-term global demands.

There are many ongoing programs to sustain this remarkable growth rate. Programs aimed initially at productivity gains provide second and third order economic, environmental and security benefits. Biotechnology and transgenic technology programs funded by USDA have the potential to eliminate a variety of diseases in both crops and animals. Variable rate application of lime, fertilizer, seeds, fungicide, and insecticide promises higher crop yields at lower costs. Narrow row corn production combined with conservation tillage saves time, fuel, water, and labor while reducing production costs. Developed and transitional nations with growing disposable incomes show an increased demand for added-value products. These international trends offer increased opportunity to the mature US agribusiness industry.

### **Long-Term**

There are those who offer words of caution in assessing the continued competitive advantage of US agribusiness. Prevailing concerns include the concentration of various parts of the food chain and the effects of globalization on domestic agriculture objectives and trade negotiations. The President of the National Farmers Union noted, "The dramatic increase in mergers, acquisitions, consolidations and strategic alliances has a substantial impact on market competition for both producers and consumers."<sup>[28]</sup> The long-term impact may be governmental policies that hamper US agricultural exports while benefiting imports from global competitors.

Similar to the short term, the long-term industry outlook is promising, yet different. The most dramatic future development may be a paradigm shift in which crops no longer define the business. Rather, future business may determine the crops. Examples include bio-fuel, new medical products, and even paper production. The US is well positioned to take advantage of such a shift with its traditional strong emphasis in research and development. Biomass energy production is one such example. It could help offset domestic fuel production shortfalls with renewable, environmentally friendly resources. It may also provide opportunities for reduced dependence on imported oil. The emphasis and predictions for a new bio-based economy should lead to a continuation of our nation's agribusiness pre-eminence throughout the world.<sup>[29]</sup>

## **GOVERNMENT GOALS AND ROLES**

The role of government in agribusiness is multifaceted. Foremost, it must protect our national security by ensuring the availability of adequate quantities of safe nutritional food for the American public in times of peace and war. Maintaining a healthy American agricultural base is vital to this goal. To promote a healthy agricultural base, the government must ensure food safety and security, ensure the economic viability of the farming industry, eliminate international trade barriers, develop open markets,

and ensure environmentally sound practices are used to protect and conserve limited national land, water, and natural resources. Government has the lead role in funding national agricultural research and development and educating the public on proper nutrition. It also has a global role in the proper utilization of our national agricultural base to provide humanitarian assistance to nations in need.

To perform its role, government has the responsibility to regulate, promote, and develop segments of the agribusiness spectrum. Pursuant to the areas studied, we identified segments of the business that deserve special attention. In order for our agricultural products to compete globally against agricultural exporting countries with lower labor and land costs, it is imperative to leverage advances in technology and biotechnology to improve our productivity. Government has a central role in supplying funding for needed research in these fields and we support an increase in government funds for this purpose. Government also has the difficult responsibility to properly regulate the biotechnology industry to protect the American consumer while not inhibiting promising research.

### **Trade Barriers and Subsidies**

The US Government must lead the world to work towards the elimination of domestic and international trade barriers. Free and open global trade for agricultural as well as manufactured goods will expand export markets for US agricultural products and increase the strength of the US agricultural base. The US must persuade countries with inhibitory, unscientific, or political barriers to safe genetically modified products to eliminate their protectionism. The US should support the World Trade Organization (WTO) in its mandate to eliminate tariffs and quotas, which inhibit free trade.

The US Government should gradually decrease subsidies for commodities currently programmed under the 2002 Farm Bill while offsetting the decrease with incentives for non-profitable farmers to transition to more profitable crops. New potentially more profitable crops are regionally dependant and many are developed through continued advances in research and development. Subsidies result in overproduction, low prices, and an increasing dependency of farmers on government support. It also fosters international anger and protectionism that restrict global free trade. Reduction of these subsidies coupled with increased research and development and incentives for inefficient farmers to transition to more profitable crops would strengthen the agricultural base for the future.

### **Food Safety and Security**

The Federal Government has the responsibility to ensure the safety and security of the nation's food supply. The US currently has one of the safest food supplies in the world, but it is constantly under pressure from new or evolving organisms, disease outbreaks, and bioterrorism threats. To improve efficiency and ensure continued safety and security, it is imperative that we consolidate the dozen federal agencies with jurisdiction over various aspects of the nation's food supply into a single food safety agency. This would allow a consolidated risk analysis of the food supply, uniform regulations, and the flexibility to appropriately allocate resources. In addition, it would lead to standardized security procedures for farms, processing facilities, and transportation activities. Finally, it would facilitate a comprehensive national plan to define roles of local, state, and federal agencies in preventing and responding to agroterrorism.

### **Land and Water Conservation**

The 2002 Farm Bill implemented policies that include a conservation section. The conservation section includes comprehensive land use programs with goals to improve the quality of soil, water, and the ecosystem. The policy to retain cropland, grassland pasture, range, and forest-use lands for future use in the agribusiness industry should continue, and we should strengthen protection for our economic future. Federal, state and local policies need to prioritize conservation ahead of increased production and start us on the path to planned urban growth. We need a long-term plan that balances the needs of

our expanding population for housing and recreation areas with the need to preserve productive farmland. Part of the comprehensive policy should emphasize directing urban and suburban growth to non-productive agricultural land, or at least less productive land, thus preserving the best land for food production.

We need a national policy to deal with water conservation and use. The future risks of limited availability of usable water for agriculture, much less direct human consumption, require acknowledging the issue now and implementing strategies to deal with it. Better planning for population centers and better water conservation in existing urban areas will help. The US government should direct part of the increased research and development funding to improved and more efficient water usage in farming and food processing. The federal government should develop a National Water Policy that will aim for water use efficiency, improved water quality, and equitable use. Since water availability is a global issue that threatens stability in many vital areas, the United States needs to actively participate in international discussions that deal with water issues. Lastly, we need to share technological advances in extracting water, efficiently using water, and in developing plants and crops that require less water.

## **Education**

Our comprehensive policies on land and water use should also include education programs for all segments of the agribusiness industry. Not only must we develop our land wisely, but we also must use it wisely. Farming methods that reduce erosion and runoff, such as no-till, and more efficient irrigation methods, such as drip irrigation, need to be spread and encouraged. New technologies will become more cost effective as they become more widely used and the government can help spread the word through extension service and USDA offices around the country. As an incentive, we suggest the next Farm Bill include a provision that pays a specified amount to farmers who complete a land and water use training program.

Along with cooperating on water issues, the government should maintain an active role in working with international organizations on global population growth. With a projected 50% global population growth by 2050, the world faces tremendous pressure on its food and water supplies. Controlling the global growth rate, particularly in those underdeveloped areas that cannot feed themselves now, will enhance future global stability. We have the information and technology to assist these nations in their efforts. We need to work through international organizations, especially Non-Governmental Organizations (NGOs), to educate these nations and their populace and gain acceptance of the benefits.

One other important area in which the government has a stake is health and nutrition. While we have an abundance of relatively cheap food, we are incurring huge costs each year due to disease and premature death from poor nutrition and obesity. The USDA is responsible to both advocate the food industry and its products and educate the public on good nutrition. This is an inherent conflict. The government should separate these responsibilities by making Health and Human Services (HHS) the lead government agency responsible for nutrition education. The US government should implement a comprehensive and tailored education program that will replace the existing, and often criticized, food pyramid.

The essays in the following section elaborate on issues noted above, and provide a more detailed summary of the four major agribusiness areas evaluated by this Industry Study seminar.

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## **ESSAY: WATER USE AND CONSERVATION**

Water is a strategic resource and an essential input to the agribusiness industry. Although much of the earth is covered with water, only three percent is fresh water with two percent of that located in ice caps and glaciers. As a limited resource, water use presents challenges for the US and the world. As

population, industry, and the demand for food grow, demand for fresh water will continue to increase. Some analysts believe that conflict over fresh water access will cause future wars. The limitation of water as a readily available strategic resource directly impacts agribusiness industry health. In order to manage future challenges, the industry will be forced to pursue creative supply strategies including new technologies that reduce water use. Additionally, a comprehensive, integrated federal water policy could help the country deal with future shortages and possibly prevent potential future water conflicts in or between states.

The world's supply of fresh water is found in either surface sources – rivers, lakes, and streams – or as “groundwater” in natural underground water tables called aquifers. Both are replenished by rain and snow. Groundwater accounts for approximately 90 percent of the supply of fresh water in the US.

[30] Technological advances have helped people gain access to groundwater and to decrease its cost. However, groundwater can be withdrawn from aquifers faster than it is replenished resulting in an overdraft. As groundwater supply diminishes, wells dry up, water quality decreases, aquifers fill with seawater, and water prices increase.

## A Question of Demand and Supply

Globally, there are indicators of a coming fresh water shortage. According to the United Nations' *2003 World Water Development Report*, the world's supply of available fresh water is shrinking fast. Without dramatic improvements in water management world wide, an estimated seven billion people in over 60 countries could face water shortages in as early as twenty years. [31]

The United Nations defines access to fresh water as having 20 liters per person per day available from a source within one kilometer of a person's home. The UN's dictum is “access to clean water is a human right.” The *World Water Development Report* ranks the United States 12<sup>th</sup> in fresh water quality (Finland is ranked #1) and 63<sup>rd</sup> in fresh water quantity (Greenland is ranked #1) of the fresh water available in countries worldwide. With 70 percent of the world's available fresh water used for irrigation, methods to improve water availability merit exploration, including better management, conservation, and innovative agricultural techniques. [32]

Although considered a low priority when compared to water used for people or agriculture, wildlife needs water too. More than 90 percent of the wetlands in the Central Valley of California have been destroyed due to extensive damming, diverting, and overdrawing of California's rivers. Fisherman and sectors supporting them have also been hurt, with 80 percent of California's commercial salmon fishing fleet closing in the past ten years. [33]

On the other hand, people are considered the most important user of water and their requirements are growing as population grows. The US population is expected to increase to 404 million by 2050.

[34] Developers rarely consider the long term affects of their projects, and decisions are typically based on availability of inexpensive land rather than access to fresh water.

The classic clash of supply and demand is evidenced in the Middle East, where other problems often dominate the news. There, water resources are plummeting and allocation of the three major surface water resources is critical. Meanwhile population growth, increased agriculture and industrial use, continually growing desertification, and increasing salination and pollution stress fresh water availability. Many fear that fresh water availability in the Middle East is moving this already volatile region closer to crisis. However, agriculture could be the issue that creates an opportunity for collaboration and cooperation to solve these challenges.

## Water Use Strategies

Agriculture is by far the biggest user of fresh water. Currently, 70 percent of US fresh water

consumption is for agriculture. The US Food and Agricultural Policy Committee recognizes that: "...because agriculture accounts for such a large percentage of total water use, agriculture is uniquely positioned to be part of the solution."<sup>[35]</sup> Irrigation is typically wasteful. Some estimates indicate that only 40% of all irrigation water gets to where it is needed. Additionally, food experts state "the world will need to double food output in the next 50 years to feed a fast-growing population."<sup>[36]</sup>

Fortunately for US citizens, American ingenuity is alive and well. From Louisiana, to Arkansas, to California, American farmers and agricultural experts are hard at work creating new water use strategies. American researchers and farmers are strategically partnered in developing several improvements including farmer education programs, water pollution reduction, soil moisture monitoring technology, predicting rainfall patterns to reduce water use, and water conservation through improved irrigation methods. By improving water use strategies, the US could very likely avoid future fresh water shortages at a time when the global demand for fresh water availability could come to the point of armed conflict. Water, perhaps more than energy resources, could become a future cash crop.<sup>[37]</sup>

Thus, technological advances have potential to alleviate some of the water shortage. Unlike sophisticated weapons technology whose existence is tightly protected and transfer to lesser-developed nations prohibited, improved water use strategies and agricultural techniques can be readily shared for the benefit of all nations without fear of compromise. Consequently, these improvements should continue to be explored and, when proven successful, shared globally.

## Policy Changes

Federal policies and programs could also help mitigate fresh water shortages. The current federal role in water policy has evolved over nearly two centuries, and includes investment in water resources infrastructure, creation of water quality standards and regulations, and laws affecting both the use and stewardship of fresh water resources.<sup>[38]</sup> Responsibility for development and management of US water resources is divided among many federal, state, local, tribal, and private interests. Historically, project development as well as environmental and resource management activities, have created a complex web of federal and state laws and regulations, contractual obligations, and economies based on existing water resources infrastructure.<sup>[39]</sup> No fewer than four Congressional authorizing committees, and 12 standing committees in the House and Senate oversee water policy jurisdiction.<sup>[40]</sup>

A new national water policy should aim to achieve four objectives: water use efficiency; water quality and equitable use; ecological integrity; and participatory decision-making. In addition to a new water policy, federal departments and resources should be realigned to support water use management. Just as the new Department of Homeland Security was created to align and improve Homeland Security roles and missions, the same concept could be applied to the "Department of Natural Resources." While respecting states rights to manage locally, both the financial resources and technical assistance of the federal government will be important in resolving water resource issues.

A "one size fits all" water management approach is not practical given the geographic differences from coast to coast. Yet a comprehensive change to federal water resources management is needed. Such an approach should incorporate current thinking, the latest technology, efficient management practices, and sensible and coordinated partnering of federal, state, local, and private interests. Competition for available fresh water requires making difficult choices. Equitable decisions will require applying the strength and experience of the federal government. Citizens should be better informed about conservation, and should pay fair prices for the resources they use, while being protected from unscrupulous practices.

When costly infrastructure repair or construction is needed, the government should encourage competitive private involvement or partnering of public and private entities. A Government Accounting Office report on water infrastructure found that 60-71 percent of wastewater and drinking water utilities

respectively covered costs when combining user-fees with funding from other local sources. Public and private ownership did not differ from one another.<sup>[41]</sup> Thus the potential exists for federal and private interests to work together to keep the US strong and productive, and to provide for the “common good.”

An assessment of US fresh water resources reveals that there are valid challenges for the future. There is no substitute for fresh water. The current trends of population growth and increased requirements for agriculture and industry, stretches demand beyond supply and are not expected to change. The agribusiness industry is uniquely situated – due to its large usage – to help resolve those issues. Two actions could address the challenge to fresh water availability. Technology can improve water use and national policy can improve fresh water allocation. However, continuing to have a clean, safe fresh water supply in the US will require urban water conservation and better planning of new population centers based on water availability.

*COL Phil Smith, Col Dror Roffe, LTC Shelley Mahood, and LTC Tom Swinson*

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## **ESSAY: LAND USE**

For centuries, land has been considered first and perhaps the most important element of power, for it is from land that all resources are defined. Land and unique geography define specific climates. Climates define sustainable plant and animal life. Land provides us with a foundation for initial survival needs such as food and water, and only in our recent history have underground resources been unearthed to unlock precious minerals and energy sources.

Land all but defines a Nation’s foundation of international power as it defines the environment, geography, climate, and associated resource potential. Nations continue balance of power struggles over land and its resources, as land is not created equal. As world population continues to grow, the consequence of a nation’s land use is increasingly a priority, as well as a global concern. Increased numbers will require additional resources, and as Mark Twain once explained, “the problem with land is that they stopped making it some time ago.”

### **United States**

The US is blessed as an agricultural nation. It has abundant land (2.3 billion acres) with a temperate climate and ample fresh water to meet the needs of its people. That land includes about 28 percent forest-use land, 26 percent pasture and range, and 20 percent cropland.<sup>[42]</sup> However, land use has transformed over time. The number of farms in America peaked in 1935 near seven million. In 1997, 1.9 million farms remained, but the number of acres per farm has increased from about 160 in 1935 to about 475 today.<sup>[43]</sup> Therefore it is easy to conclude that smaller farms have declined while corporate farming enterprises are growing larger. Additionally, relocation of agricultural land ownership from the federal government to the private sector has provided the industry with the bulk of land assets. Today 99% of the nation’s cropland, 61% of the grasslands pasture and range, and 56% of forestland is privately owned.<sup>[44]</sup>

Productivity has tripled in fifty years using approximately the same amount of cropland. Increased use of information technology, weather forecasts, satellite imagery, and further advancements in bioengineering is expected to continue productivity growth. Continued growth is necessary to offset urban encroachment, and increasing population. Urban sprawl has dramatically increased the value of farmland, creating huge opportunity costs for farmers who opt to stay in agriculture rather than sell their land for conversion to urban use (see Figure 1, Appendix A).<sup>[45]</sup> Urban area, however, still represents



only 3% of US land area (about 76 million acres in 1997). Short-term impacts to US ability to feed itself are negligible, with future prospects optimistic due to technology improvements. However, due to the irreversible nature of urban development, we must consider a long-term strategic land use forecast.

National power is increasingly defined by those nations who possess a combination of favorable climate, arable land, abundant water, and a knowledgeable, skilled, and productive workforce committed to a healthy agribusiness industry. In addition to scientists, technologists, farmers, and ranchers, politicians shape the laws and policies of a nation's land use. In a capitalist system, land use can be looked at, as any other resource for an enterprise's short-term gains; or perhaps a longer-term outlook is prudent due to its strategic value. In a socialist system, land use may be entirely controlled by the politicians, however, examples abound where control and corruption take its toll on productivity and efficiency.

## Government Policy

Government policies attempt a balancing act between economic, and national security to any significant industry. National security concerns such as the military industrial base issues tax the very nature of this balance between efficiency and security. The ability of a nation to feed itself clearly falls within this context, as most developed countries have elected to sacrifice efficiency for support to its domestic farming, suggestive of its importance to national security. Within nations in the Organization for Economic Cooperation and Development (OECD), government farm support is quite consistent (see Figure 2, Appendix A) – almost two thirds of farm receipts. Additionally, some of the newest OECD members, such as Poland and Mexico, have increased supports, suggesting that as soon as a country becomes rich enough, it steps up protection of its farm sector.<sup>[46]</sup> Two examples of differing approaches to government policy are offered to demonstrate how Nation's and their leadership view and support its strategic land use.

**US Farm Bill:** Policy implications dramatically impact farming. US farm policy foundation is essentially a risk reduction program designed to support the farmer. Livelihoods of farmers depend significantly on factors beyond their control. Disease, weather, increased costs of production, export markets, and uncertain pricing play havoc on a critical industry that must survive. Farm policy objectives support a wide range of outcomes from individual farmers to industry wide commodity and land use initiatives.

The 2002 Farm Bill has provisions to support production of a reliable, safe, and affordable supply of food and fiber; promote stewardship of agricultural land and water resources; encourage economic and infrastructure development in rural America; and ensure continued research to maintain an efficient and innovative agricultural and food sector.<sup>[47]</sup> In addition to providing a producer safety net, some new features include a conservation section and an energy production opportunity for farmers based on the first-ever farm bill energy title.

A significant portion of the bill is future focused such as conservation. Conservation includes comprehensive land use programs (e.g. wetlands, grasslands, farmlands), as well as conservation practices with goals to support and improve the quality of soil, water, air, plant, and animal life. Quality of life and conservation efforts on this scale represent significant concern for the health of the future industry, as well as potential future cropland mobilization to support a growing population. Additional future focus is evident with specific funding targeting education and research of bio-based energy. Bio-energy programs show great potential to transform our dependency on irreplaceable fossil fuels. This potential lends additional strategic importance to the US farm policy of today and tomorrow.

**Russia Land Reform:** The 1991 unraveling of the Soviet empire was fast, unpredicted and marked a significant change in the tides of history. Today's Russia continues as a nation in transition, moving from a command economy with agricultural factors of production owned and controlled by the state to a capital economy driven by consumer preferences. Russia has large agricultural capacity; yet,



current production and productivity continue a downward trend. Current legislation legalizing sale of land, though offering historic opportunity, is not a panacea. Russian experience in agricultural reform offers rich lessons to US policy makers supporting domestic and international issues. Russian examples demonstrate a productive, efficient, quality agribusiness industry requires more than traditional factors of production (land and labor). Complex factors of history, culture, property rights, finance, market system factors, bureaucracy, and populace perceptions offer a few, explanations for Russia's agricultural inertia.

Arguably, the US and Russia share a perceived cultural value in the "spirit of the land." On paper, legislative actions of Russia, with the exception of foreign ownership, appear quite similar to the US model. Yet, similarities stop there. We have realized rights of property, perceive our legal system as predictable and consistent, have access to credit, and realize a functioning agricultural and land market system. As a young nation, we carry no historical/cultural baggage of a command-structured nation. Legislation can address several of Russia's challenges; however, changing populace perception is most significant. Perception of "favored sons" of the state continues, and small private farmers remain suspect of state actions. Passage of time, consistency of legal interpretation, and proven value of rights of ownership must take place before a real land market will emerge.

## Summary

Government policy plays a significant role when considering long-term impacts of land use. Trends are good predictions of future needs. With a 50% global population growth between 2000 and 2050, food production must increase. Most of this population growth will take place in underdeveloped nation-states located in water stressed regions. In many nations, agribusiness industry projections identify insufficient growth to meet food demands. With the world's largest amount of arable land per capita, the US can surge production to help meet world demands.<sup>[48]</sup>

There are many stakeholders that participate in US agribusiness land management. Internationally, they include our trading partners and the World Trade Organization. Domestically, the executive and legislative branches of government, federal, state and local agencies, the food processing industry, restaurants, consumers, and finally the farmer and farm owners all play a part in how we manage agricultural land assets. Farming touches every state, and therefore the viability of our agribusiness industry affects the collective whole of the nation.

*Col Ken Wiggins, CAPT Peter Murphy, LtCol Laura Sampsel, Mr. Tom Benedik*

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## ESSAY: GRAINS AND FIBERS

The concept of transformation is applicable to the broad scope of the Grains and Fibers area. The areas specifically considered represents change that either has occurred, is occurring, or should occur in the future. As a whole, they represent an agricultural transformation within the grains and fibers arena.

## 2002 Farm Bill

The Farm Security and Rural Investment Act of 2002, better known as the Farm Bill, compared to its predecessor, the 1996 Farm Act, represents a change in how the US Government addresses commodity price support payments within its farm policy. The 1996 Farm Act attempted to wean farmers off subsidies and redesigned income support for major crops. Falling prices in the late nineties necessitated the need for supplemental assistance and a reevaluation of farm subsidy policy. Eventually, the 2002 Farm Bill replaced the 1996 Farm Act. Today it governs agricultural programs for

commodities, trade, conservation, rural development, nutrition, credit, forestry, and energy through 2007.

Its purpose is to supply enough money to grain farmers to do away with the need for annual disaster supplemental bills during periods of low prices by providing direct payments for wheat, feed grains, cotton, rice, and soybeans; counter-cyclical payments; and higher loan rates for most crops.<sup>[49]</sup>

The effect of all these changes is an increase in farm income.<sup>[50]</sup> Its main shortcoming is that it encourages grain farmers to overproduce which keeps prices down and makes the farmer more dependent on future subsidies. Unfortunately, there are no provisions or incentives in the Farm Bill to help farmers transition to other, perhaps more profitable crops.

Passage of the Farm Bill is certain to cause substantial international rift. Other grain producing countries see it as detrimental to their farmers by artificially keeping the price of grain too low and making it difficult for their farmers to compete. There is also valid concern that the subsidies will exceed the US' World Trade Organization subsidy limit of \$19.1 B.

While subsidies keep many farms in operation, they do nothing to prepare farmers for the day the WTO mandates reduction in agricultural subsidies. The next edition of a farm bill must increase funding for research and development in order to reduce grain farmers' dependence on subsidies. It also must provide incentives to transition to crops that are more profitable.

### **Genetically Modified (GM) Grains**

The use of genetically modified grains represents ongoing change that leads to more nutrition in diets. GM grains represent a means to grow better and more productive crops. In lay terms, genetic modification refers to the transfer of genes from one pool to another in different organisms. Farmers in the US have manipulated seeds from the early days of the republic. However, GM crops are still not universally accepted either in the US or abroad. Suspected unintended health issues and environmental concerns usually dominate opposition reasoning.

In the US today, an estimated 70% of processed food contains GM ingredients. The major crops that undergo modification include corn, soybeans, cotton, potatoes, squash, and papaya.<sup>[51]</sup> Dr. Autar K. Mattoo, a research leader at the USDA Agricultural Research Center, stated during his presentation to the industry study on February 21, 2003, "The prime reason for genetic modification in agriculture is to continue to improve the quality and yield of the products on which we all depend. GM grains resist disease better, contain more nutrition, and thrive in drought conditions, even in poor soil." Overall, genetic modification improves crop yield, reduces chemical and labor inputs, aids in soil conservation, saves water resources, brings some unusable wasteland into productive use, provides increased nutritional benefits, and appears to provide some solutions to help with the global problems of climate change.

The United Nations estimates that 12.6 million people in six countries in Southern Africa alone urgently need help to avoid starvation. GM grains may represent life or death for millions of starving people all over the world, yet many countries still refuse them for fear that GM grains might damage their farm exports or place them in permanent dependence on western nations.<sup>[52]</sup>

### **Alternative Fiber Crops**

The use of alternative fibers to replace wood fibers in paper products represents a future change. Consumption of paper and paperboard products is growing exponentially worldwide.<sup>[53]</sup> The US, the largest producer of the paper, paperboard, and pulp, is also the world's leading consumer of paper products.<sup>[54]</sup> Meanwhile, the number of large farms specializing in commodity crops is increasing each year. They tend to produce a surplus of production, depressing prices, making it hard for small farmers

to compete, and driving many out of business.

A solution to both these problems would be the identification of alternative sources of raw material for paper and paperboard production within the US that will also provide farmers alternatives for new, moneymaking, non-food agricultural crops. Additionally, there is a growing consensus that farms offer more sustainable sources of fiber than will forests in the future. Potential sources for agri-based non-wood fibers are crops grown specifically for their fiber content alone such as kenaf or industrial hemp.

Kenaf pulp represents the most likely substitute and is very close in quality to that obtained from wood and lends itself well to the paper manufacturing process. One of its major advantages is its rapid growth rate along with a high pulp yield, typically yielding 50-60% as compared to southern pine's 43% yield. Small farmers can grow kenaf as a means of diversifying their operation and gain alternate market opportunities without tying up their land for long time-periods. Kenaf is naturally hardy, resists most pests and diseases and usually requires fewer pesticides and herbicides in order to grow.<sup>[55]</sup> It also requires less energy to pulp than wood fibers.<sup>[56]</sup> The average price mills pay for kenaf fiber is \$50-\$60 per ton, which is competitive with wood fibers and compensates the grower appropriately for his risk and costs.<sup>[57]</sup>

## The Food Pyramid

From the standpoint of food consumption, grains and fibers have major implications on the health and well being of the American populace and economy. The US population is eating plenty, but not eating well. Average daily intake has increased by almost 400 calories per day, so Americans should be more concerned about what and how much we are eating.

The Economic Research Service reports that four of the top ten leading causes of death in the United States are linked to diet. The associated costs of treatment and lost productivity are enormous, estimated at more than \$200 billion a year. Unhealthy diets that contain insufficient amounts of dietary fiber are major contributors to chronic diseases and other health conditions.

In 2001, the Surgeon General reported the following alarming statistics: "Approximately 300,000 US deaths a year currently are associated with obesity and overweight. The total direct and indirect costs attributed to overweight and obesity amounted to \$117 billion in the year 2000."<sup>[58]</sup> Furthermore, "In 1999, an estimated 61 percent of US adults were overweight, along with 13 percent of children and adolescents. Only 3 percent of all Americans meet at least four of the five federal United States Department of Agriculture Food Guide Pyramid recommendations for the intake of grains, fruits, vegetables, dairy products, and meats."<sup>[59]</sup>

According to USDA's Healthy Eating Index, only 12% of Americans have a diet classified as good,<sup>[60]</sup> the remaining 88% are rated as either having poor diets or are in need of improving the nutritional quality of their diet.<sup>[61]</sup> It will continue to be an uphill battle to change attitudes, behavior, and eating practices. This is especially true when sophisticated food advertising that focuses on other enticements rather than nutritional/health value overwhelms consumers. The food industry accounts for approximately 16% of the mass media advertising market, spending more than \$33 billion a year to advertise and promote their products. (Only 2.2% of these advertising dollars were for fruits, vegetables, grains, or beans.) USDA, on the other hand, spent just over \$300 million on nutrition education, mostly for research, evaluation, and demonstrations that targeted a much smaller group of people. Accordingly, we must provide a more effective counter to the food industry's information and lobbying campaign. It is costing us dearly to do otherwise; the opportunity costs associated with obesity and poor health are extremely high.

*COL Bob Webb, LTC Nate Buchheit, CDR Garland Stephens, and Mr. Andre Somerville*

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## **ESSAY: FOOD SAFETY AND SECURITY**

Today, ensuring the safety of our food supply takes on additional importance and meaning. Food safety means preventing unintentional contamination of food or food supplies, while food security means preventing intentional food contamination.<sup>[62]</sup> Going one step further, we can define agroterrorism as “the deliberate introduction of a disease, either against livestock or into the food chain, for purposes of undermining stability and/or generating fear.”<sup>[63]</sup> Food safety and food security are similar disciplines aiming for the same end – a safe food supply.

### **Federal Involvement**

The US government spends more than \$1 billion per year on food safety under 35 laws implemented by at least 12 agencies. Still, the Centers for Disease Control (CDC) estimates that we have 5000 deaths and 76 million illnesses every year from foodborne disease.<sup>[64]</sup>

The main players are the Food Safety and Inspection Service (FSIS) within the Department of Agriculture, and the Food and Drug Administration (FDA). FSIS inspects meat, poultry, and egg products and the FDA is responsible for everything else. Also, FDA is responsible to ensure that drugs and feed used in food-producing animals are safe. Some of the dangers that these inspections look for include pathogens, allergens, or simple mislabeling.

The two agencies have different methods for carrying out their responsibilities to inspect food and food processing facilities. FSIS inspectors work in beef and poultry processing plants every day. However, on average FDA only inspects facilities every 5 years.<sup>[65]</sup> FDA can only regulate a food if it or its ingredients have been in interstate commerce. A telling statistic is that FDA is responsible for 75% of the food products consumed in the US,<sup>[66]</sup> and 2/3 of food-borne illnesses involve FDA-regulated food, but FDA only receives 1/3 of the total US food inspection budget.<sup>[67]</sup>

Despite all of the safeguards and inspections, between 1984 and 1999, there were over 3700 recalls of dangerous food products. These recalls were all voluntary - neither agency can mandate a recall. Additionally, FDA inspects less than 1% of the estimated 3.7 million shipments of imported food into this country each year.<sup>[68]</sup> FDA can mandate a prompt recall of harmful drugs and medical devices, but not food. The Consumer Product Safety Commission can mandate nationwide recalls of Happy Meal toys,<sup>[69]</sup> but USDA/FSIS can't mandate recall of the hamburger.<sup>[70]</sup>

### **Food Irradiation**

The last line of defense in food safety is the consumer who practices safe food handling and preparation. One piece of technology that can help the consumer is food irradiation. In this process products are exposed to radiant energy including gamma rays, electron beams, and x-rays in amounts approved by the FDA. This does not cook the meat or make it safe to eat raw. It reduces the harmful bacteria but generally doesn't make the meat or poultry product sterile. Irradiation doesn't alter proper cooking or food handling by producers, retailers, or consumers.

FSIS inspects all meat and poultry products, including those that are irradiated. Only inspected establishments, that meet the requirements specified in the Federal regulations, are able to irradiate meat. Additionally, FSIS conducts microbial testing to ensure plants are producing wholesome products

and to verify any pathogen reduction claimed by the plant.

Irradiation reduces the number of pathogens in refrigerated or frozen raw meat and poultry sold to consumers, but it does not destroy them all. The FDA evaluated irradiation over the last 50 years and found it safe. Thirty-seven countries have approved food irradiation for more than 40 food products. Examples of meat and poultry that may be irradiated are whole or cut-up birds, skinless poultry, pork chops, roasts, stew meat, liver, hamburgers, and ground meat. Hospitals have used irradiation for many years to sterilize food for cancer patients and others with weakened immune systems. Some perishable food taken into space by astronauts is irradiated to guarantee the food is free of disease-causing organisms.

## Preventing Agroterrorism

Food security includes preventing agroterrorism at any step in the agribusiness process. While we have improved packaging, security and inspection procedures at processing and distribution centers, vulnerabilities remain at the farm and in our transportation systems.

Most animal disease agents can be handled without the risk of infection. The disease agents that pose the greatest threats to livestock include foot-and-mouth disease (FMD) virus, classical swine fever (hog cholera) virus, and African swine fever virus.<sup>[71]</sup> Spreading an animal disease agent is simple – disseminate a diluted virus preparation with an atomizer or smear the preparation directly on the nostrils or mouths of the animals.<sup>[72]</sup> Unfortunately, the concentration and accessibility of livestock in the United States makes it very easy for an agroterrorist to introduce disease agents throughout the heartland of America's farm industry.

A recent computer model showed that an animal disease, such as FMD, introduced at a few farms in a single state could sweep through 44 states within two weeks and require the slaughter of 48 million heads of livestock.<sup>[73]</sup> The economic consequences of an animal disease outbreak include the cost of diagnosis and surveillance; the direct costs of depopulation, cleaning, disinfection, and quarantine; the direct, indirect and induced losses in the economy of the country or state; and the losses due to trade restrictions.<sup>[74]</sup> If a FMD outbreak occurs in the United States, the cost to livestock producers is estimated at \$12 billion to deal with the direct consequences alone, such as the costs of drugs and veterinary services, lost production, and lower prices.<sup>[75]</sup> The cost of replacing entire herds of livestock and the possible need to decontaminate an entire area may put the individual farmers' recovery beyond reach.

We can counter the threat of an agroterrorist attack on four levels: at the organism level, through animal or plant disease resistance; at the farm level, through facility management techniques designed to prevent disease introduction or transmission; at the agricultural sector level, through disease detection and response producers; and at the national level, through policies designed to minimize the social and economic costs of a catastrophic disease outbreak.<sup>[76]</sup>

## Food Security During Transportation

The food supply transportation network includes the air, rail, trucking, and waterway sectors. In the air, we have done much to improve airline passenger security but the air cargo sector lags far behind. As recently as January 2002, no more than 4 percent of air cargo was screened.<sup>[77]</sup> While the total amount of food products moved via air is relatively small, failure to maintain proper security of food items shipped via air could be devastating.

Railroads have been critical to transporting agricultural products for more than 170 years. Security of our agribusiness products within the railroad system is crucial to the viability and



sustainment of our market segments worldwide.<sup>[78]</sup> Fortunately, railroads have proactively increased security throughout the network without unduly burdening the flow of commerce.

Trucks carry the largest portion of freight in the United States.<sup>[79]</sup> Much of this freight is food or food-related items, and most shippers and over-the-road carriers have taken specific steps – such as restricted access and more security personnel at plants, storage tank areas, and distribution centers – to increase food security. Carriers have redoubled efforts to prevent unauthorized access to trailers containing edibles, including using a wider range of seals.<sup>[80]</sup>

Today, agribusiness products account for 15 percent<sup>[81]</sup> of the nearly 800 million tons of cargo moved by barge each year.<sup>[82]</sup> The American Waterways Operators are meeting increased security needs through their Model Vessel Security Plan. While use is discretionary, companies that use the plan's procedures provide the most secure barge transport environment.<sup>[83]</sup>

## Summary

Ultimately, the best approach to food safety and security is cooperation. President Bush added the agriculture and food industries to the list of critical infrastructure sectors needing protection from terrorist attack.<sup>[84]</sup> Joint actions by producers, shippers, carriers, and distributors throughout the industry, and coordination at all levels of government, are essential.

*Col Steve Franklin, Ms. Debbie Erickson, Mr. Jim Bozzard, and Mr. Byron Shorter*

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## CONCLUSIONS

Agribusiness is a key component of our national security with direct and indirect impact on all instruments of US national power. The US agricultural base is healthy, and our nation is strong because this base is healthy. Out of this strength, we have a responsibility to help developing nations feed their people and learn to feed themselves to promote peace and stability. We have the capacity to feed ourselves, and the ability to surge production within basic growing cycles subject to quantities of critical commodities in strategic storage. We will remain a net agribusiness exporter for the foreseeable future.

Our food supply continues to have vulnerabilities, but safety and security is improving. We must ensure both safety and security, as a significant failure in either area could have a devastating impact on all sectors of our nation's economy. Continued assessment of vulnerabilities and threats must be followed with swift and sure actions to mitigate identified or potential weaknesses.

Fresh water will increase in importance as a strategic asset. A reliable fresh water supply is crucial to our continued agricultural leadership, especially since 80% of domestic fresh water consumption is currently used for agribusiness activities. We must develop a national water use policy to reduce interstate conflicts and to help guide our nation through tough choices we face on growth and development. We should work with other nations to prevent armed conflict over water, and help those in water-stressed regions to develop or enhance water use and conservation programs that ensure an adequate fresh water supply for all.

Finally, we must carefully administer and conserve our farmland. Like water, we must manage it, but unlike water we cannot make more. We must plan proactively for population growth and community expansion to lessen the impact on our ability to feed the nation and provide for international requirements. As the market for food production increases, this careful planning will reap economic benefits for our nation.

Our global agribusiness responsibilities are broad and challenging, but we possess the resources to meet those challenges. As we do so, we must lead through example, and lead other nations to do their

part in achieving a safe, secure, and reliable food supply for all people.

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







Figure 1

Figure 2

Appendix

**WHICH SECTORS ARE MOST PROTECTED**  
(tariff equivalent percentages 1999–2001, annual averages)

	 JAPAN	 EU	 POLAND	 U.S.	 CANADA	 MEXICO	 AUSTRALIA	 OECD (average)
All farm products	142	38	14	16	13	16	5	35
Wheat	538	15	22	12	1	44	1	16
Rice	631	15	N/A	45	N/A	28	2	391
Oilseeds	83	0	23	26	1	33	0	20
Sugar	107	155	119	123	N/A	91	0	119
Milk	350	79	13	96	115	78	4	86
Beef	43	364	-41	0	2	6	0	33
Pork	107	36	11	0	4	14	0	26
Poultry	12	85	35	0	1	-4	0	16
Maize	N/A	24	-18	13	9	47	N/A	16
Other grains	426	19	18	8	3	17	0	19



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## END NOTES

- [1] Statement by Col Lonnie Stith, US Army, during the 2001-2002 ICAF academic year; quoted from the 2002-2003 Agribusiness Industry Study flyer distributed during the October 2002 Industry Study Open House.
- [2] Davis, John H. and Goldberg, Ray A., A Concept of Agribusiness, Boston, Mass.: Harvard Business School, Research Division, 1957, 2.
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- [5] ICAF Agribusiness Industry Study Report 2001, 7.
- [6] “Food and Agricultural Policy,” 36.
- [7] *Ibid.*, 46.
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- [9] *Ibid.*, 21.
- [10] ICAF Agribusiness Industry Study Report 2001, 6.
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- [12] *Ibid*.
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- [15] “Food and Agricultural Policy,” 16.
- [16] *Ibid.*, 22.
- [17] *Ibid.*, A-4.
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